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THE

ELEMENTS

OF

ARITHMETIC,

ADAPTED TO THE USE OF PREPARATORY

AND

NATIONAL SCHOOLS,

AND INTENDED AS

AN INTRODUCTORY TREATISE

TO THE MORE EXTENSIVE ARITHMETICS NOW IN USE.

By JOHN DOZELL,

Master of the Free School, Rotherhithe.

"Arithmetic is of so general use in all the parts of life and business, that scarcely any thing is to be done without it."—Locke.

London:
PUBLISHED FOR THE AUTHOR;
AND SOLD BY J. G. & J. COURTHOPE, 10, GEORGE YARD,
LOMBARD STREET, AND 73, ROTHERHITHE STREET.

1827.

Price One Shilling.

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TO

JOHN CAPEL, ESQ. M. P.

PRESIDENT OF THE CITY OF LONDON

NATIONAL SCHOOLS;

CE-PRESIDENT OF THE CITY OF LONDON SCHOOL

OF

INSTRUCTION AND INDUSTRY,

&c. &c. &c.

THIS TREATISE ON ARITHMETIC,

INTENDED ESPECIALLY FOR THE USE OF

NATIONAL SCHOOLS,

IS RESPECTFULLY DEDICATED

BY HIS MOST OBEDIENT

AND MUCH OBLIGED SERVANT,

JOHN DOZELL.

PREFACE.

THERE is now scarcely a Parish in the Kingdom without a National School: notwithstanding this extension of the means of Education we have no system of Arithmetic, which, from its price, and the nature of its contents is calculated for the general use of National Schools.

To the Superintendents of National Schools I beg to observe, that as Arithmetic cannot be well taught without a thorough knowledge of the Rules, Tables, &c. so it is next to impossible that their Pupils can be well versed in these Rules, &c. without the aid of a concise Arithmetical Treatise: how far I have succeeded in supplying a deficiency, which I have myself long felt, must be left for the Public to determine.

I have introduced certain elementary Tables immediately after Numeration, because, in my opinion, they prepare the infant mind for the reception of the Rules of Arithmetic that follow. When these exercises are properly mastered, they will enable the Child, to proceed to Arithmetic, with every reasonable hope of success; and Arithmetic which has generally been considered a difficult study, will be found to be familiarized by these elementary lessons.

To avoid being superfluous, I have inserted but few examples to illustrate the Rules, as National Pupils are taught to dictate their own sums. After the Multiplication Rule I have given a Table of Composite Numbers: the great use of this Table in the Multiplication of large numbers (especially Compound) induced me to insert it.

I beg leave to return my thanks to those Friends who have kindly promised their countenance and support to this Treatise, and I trust it will be found to contain a sufficiency of Arithmetic for all the purposes of common life; and that it is worthy of the support of the Principals of Preparatory and other Academies, as well as of the several Committees of National and Parochial Schools.

J. D.

Rotherhithe, 7th of May, 1827.

THE Elements OF ARITHMETIC.

Arithmetic is the art or science of computing by digits, and has five principal Rules upon which all its operations depend, namely:

Numeration, Addition, Subtraction, Multiplication and Division.

Each of the four last Rules may be either Simple or Compound. They are Simple when only one kind or denomination is made use of in the operation; and they are Compound when more than one kind or denomination is made use of.

A simple number is a number of only one name or denomination, as 135 Feet, 235 Yards, 6987 Pounds.

A Compound number is a number of different denominations, as £5 6*s.* 8½*d.* 689 Cwt. 2 qrs. 18lbs. 27 Yards 3 qrs. 2 n.

A Fraction is a part or parts of a whole number, thus, a Farthing, a Halfpenny and Three Farthings, are all parts of a Penny, expressed thus, ¼, ½, ¾.

The Signs used in Arithmetic are as follows:

$=$ Equal. The sign of Equality; as 4 qrs. $=$ 1 cwt. signifies that 4 Qrs. are equal to 1 Cwt.

$+$ Plus or more. The sign of Addition; $4 + 4 = 8$, that is 4 added to 4 is equal to 8.

$-$ Minus or less. The sign of Subtraction; as $8 - 2 = 6$, that is 8 lessened by 2, is equal to 6.

$\times$ Multiplied by. The sign of Multiplication; as, $4 \times 6 = 24$, that is 4 multiplied by 6, is equal to 24.

$\div$ Divided by. The sign of Division; as $8 \div 2 = 4$, that is 8 divided by 2, is equal to 4.

$: \; :: \; :$ The sign of Proportion; as $2 : 4 :: 8 : 16$, that is, as 2 is to 4, so is 8 to 16.

NUMERATION.

Teacheth the different value of Digits or Figures, by their different places; and to read and write any sum o number correctly.

The Digits or Figures are as follows:

0, 1, 2, 3, 4, 5, 6, 7, 8, 9.

All numbers are expressible by these ten Figures, the usual method of Notation by these Figures is so contrived that any Character or Figure is increased in a tenfold proportion for every place it is removed towards the left among the other Figures with which it is connected; so i these Figures 333, the first 3 (reckoning from the right t the left) is 3 Ones, the second 3 Tens, and the third Hundreds, the fourth Figure would be Thousands, and s on to the highest number in the Table.

The Cipher or Nought is of no value of itself; but when placed to the right-hand of any Figure, it increases the value of that Figure tenfold for every Cipher so placed to the right.

Numbers are divided from the right-hand towards the left, into periods and half periods, each half period consists of three Figures; the name of the first period being Units, or ones, of the second Millions, of the third Billions, &c. Also the first half of any period (from the right) is so many ones of it, but the latter half is so many thousands of it.

In a half period, or number consisting of three Figures, namely, Units, Tens, Hundreds, there are seven varieties according to the use and place of the Cipher. Of Units there is only one case, as 8, of Tens two, as 80, 88; of Hundreds, four, as 800, 808, 880, 888; or varying the the Figures 2, 50, 65, 200, 308, 470, 793, these seven cases include all the varieties which can occur in writing any number not exceeding three Figures, or half a period; and every number being composed of a succession of half periods, little more is necessary to enable the learner to read and write the longest number with accuracy and dispatch.

In reading any number, care must be taken to divide the given number into periods and half periods, by alternate commas and semicolons; and putting respectively 1, 2, 3, &c. over the right-hand Figures of the periods, beginning with the second period from the right. These distinguishing marks will soon enable the scholar to begin to write down the number, at the left-hand without previously counting Units, Tens, &c.

NUMERATION TABLE.

2 1

2 3 4, 6 8 9; 5 7 6, 3 0 4; 2 5 6, 7 0 3

Figure	Place
2	Hundreds of Thousands of Billions
3	Tens of Thousands of Billions
4	Thousands of Billions
6	Hundreds of Billions
8	Tens of Billions
9	Billions
5	Hundreds of Thousands of Millions
7	Tens of Thousands of Millions
6	Thousands of Millions
3	Hundreds of Millions
0	Tens of Millions
4	Millions
2	Hundreds of Thousands
5	Tens of Thousands
6	Thousands
7	Hundreds
0	Tens
3	Units

NOTATION BY ROMAN CHARACTERS.

1	I.	
2	II.	As often as any character is repeated, s many times its value is repeated.
3	III.	
4	IIII. or IV.	A less character before a greate diminishes its value
5	V.	
6	VI.	A less character after a greater increases its value.
7	VII.	
8	VIII.	
9	IX.	
10	X.	
50	L.	
100	C.	
500	D.	
1000	M.	

Primary Lessons in forming the digits or Figures, and exhibiting the progression of numbers by unity.

1	2	3	4	5	6	7	8	9	10	11	12	13
0	0	0	0	0	0	0	0	0	0	0	0	0
	1	1	1	1	1	1	1	1	1	1	1	1
	1	1	1	1	1	1	1	1	1	1	1	1
		1	1	1	1	1	1	1	1	1	1	1
		2	2	2	2	2	2	2	2	2	2	2
			1	1	1	1	1	1	1	1	1	1
			3	3	3	3	3	3	3	3	3	3
				1	1	1	1	1	1	1	1	1
				4	4	4	4	4	4	4	4	4
					1	1	1	1	1	1	1	1
					5	5	5	5	5	5	5	5
						1	1	1	1	1	1	1
						6	6	6	6	6	6	6
							1	1	1	1	1	1
							7	7	7	7	7	7
								1	1	1	1	1
								8	8	8	8	8
									1	1	1	1
									9	9	9	9
										1	1	1
										10	10	10
											1	1
											11	11
												1
												12

The numbers at top, 1, 2, 3, &c. denote the lessons or columns; the first lesson is 0, the second, 0 and 1 are 1; the third is 0 and 1 are 1, and 1 and 1 are 2, &c. the child writing, naming, and adding the figures as he proceeds.

Elementary Lessons in Addition and Subtraction, by which, at the same time, are formed and learned the Addition and Subtraction Tables.

LESSON 1.

	0	1	2	3	4	5	6	7	8	9	10	11	12
	1	1	1	1	1	1	1	1	1	1	1	1	1
	1	2	3	4	5	6	7	8	9	10	11	12	13
	1	1	1	1	1	1	1	1	1	1	1	1	1
	0	1	2	3	4	5	6	7	8	9	10	11	12
2			2	3	4	5	6	7	8	9	10	11	12
			2	2	2	2	2	2	2	2	2	2	2
			4	5	6	7	8	9	10	11	12	13	14
			2	2	2	2	2	2	2	2	2	2	2
			2	3	4	5	6	7	8	9	10	11	12
3				3	4	5	6	7	8	9	10	11	12
				3	3	3	3	3	3	3	3	3	3
				6	7	8	9	10	11	12	13	14	15
				3	3	3	3	3	3	3	3	3	3
				3	4	5	6	7	8	9	10	11	12
4					4	5	6	7	8	9	10	11	12
					4	4	4	4	4	4	4	4	4
					8	9	10	11	12	13	14	15	16
					4	4	4	4	4	4	4	4	4
					4	5	6	7	8	9	10	11	12
5						5	6	7	8	9	10	11	12
						5	5	5	5	5	5	5	5
						10	11	12	13	14	15	16	17
						5	5	5	5	5	5	5	5
						5	6	7	8	9	10	11	12
6							6	7	8	9	10	11	12
							6	6	6	6	6	6	6
							12	13	14	15	16	17	18
							6	6	6	6	6	6	6
							6	7	8	9	10	11	12

	7	8	9	10	11	12
	7	7	7	7	7	7
7	14	15	16	17	18	19
	7	7	7	7	7	7
	7	8	9	10	11	12

	8	9	10	11	12
	8	8	8	8	8
8	16	17	18	19	20
	8	8	8	8	8
	8	9	10	11	12

	9	10	11	12
	9	9	9	9
9	18	19	20	21
	9	9	9	9
	9	10	11	12

	10	11	12
	10	10	10
10	20	21	22
	10	10	10
	10	11	12

	11	12
	11	11
11	22	23
	11	11
	11	12

	12
	12
12	24
	12
	12

Elementary Lessons in Multiplication and Division, by which, at the same time, are formed and learned the Multiplication and Division Tables.

LESSON I.

0	1	2	3	4	5	6	7	8	9	10	11
1	1	1	1	1	1	1	1	1	1	1	1
1)0	1	2	3	4	5	6	7	8	9	10	11
0	1	2	3	4	5	6	7	8	9	10	11

2	2	3	4	5	6	7	8	9	10	11
	2	2	2	2	2	2	2	2	2	2
	2)4	6	8	10	12	14	16	18	20	22
	2	3	4	5	6	7	8	9	10	11

3	3	4	5	6	7	8	9	10	11
	3	3	3	3	3	3	3	3	3
	3)9	12	15	18	21	24	27	30	33
	3	4	5	6	7	8	9	10	11

4	4	5	6	7	8	9	10	11
	4	4	4	4	4	4	4	4
	4)16	20	24	28	32	36	40	44
	4	5	6	7	8	9	10	11

5	5	6	7	8	9	10	11
	5	5	5	5	5	5	5
	5)25	30	35	40	45	50	55
	5	6	7	8	9	10	11

6	6	7	8	9	10	11
	6	6	6	6	6	6
	6)36	42	48	54	60	66
	6	7	8	9	10	11

		7	8	9	10	11	12
		7	7	7	7	7	7
7	7)	49	56	63	70	77	84
		7	8	9	10	11	12

		8	9	10	11	12
		8	8	8	8	8
8	8)	64	72	80	88	96
		8	9	10	11	12

		9	10	11	12
		9	9	9	9
9	9)	81	90	99	108
		9	10	11	12

		10	11	12
		10	10	10
10	10)	100	110	120
		10	11	12

		11	12
		11	11
11	11)	121	132
		11	12

		12
		12
12	12)	144
		12

ADDITION.

Teacheth to add two or more numbers together, to make one whole or total sum.

Rule—The Numbers must be placed directly under each other, Units under Units, Tens under Tens, &c.; then beginning with the first row of Units, add them up to the top; when done, set down the Units, and carry the Tens to the next, and so on continuing to the last row, at which set down the total sum or amount.

To prove Addition by Subtraction—Cut off the top line, by drawing a line below, add the remaining lines together (downwards) and set their sum below the number first found, the last number being subtracted from the former, will leave as a remainder, the same number as you have cut off at the top; which being the case, the sum is right.

EXAMPLES.

537

509
8346
764
9543

19699 Answer.
19162

537 Proof.

Required the sum of 3579, 876, 9763, 4584, 9763.

What is the sum of 9763, 5845, 764, 8760, 9507, 8567, and 9843?

SUBTRACTION.

Subtraction is the finding how much one number exceeds another, or the taking a less number from a greater.

The number to be subtracted is called the Subtrahend; and that from which it is to be taken, is called the Minuend; also the number remaining after the one is taken from the other, is named their difference.

Rule.—Place the Subtrahend under the Minuend, Units under Units, &c. (according to the directions given in Addition) and draw a line below them.

Begin at the right hand, and subtract each under figure from that which stands above it, writing the remainder straight under them below the line; so shall all the remainders together express the difference required.

But when any under figure exceeds that which is above it, conceive 10 to be added to the upper, and subtract the under from the sum; but in this case you must add 1 to the next lower figure, before you subtract it.

Proof.—Add the Difference and Subtrahend together, and the sum will be equal to the Minuend when the operation is right.

EXAMPLES.

From	8 5 4 6 7 3 5 2 0 4	Minuend.
Take	3 9 5 4 0 7 8 5 2 1	Subtrahend.
Remain	4 5 9 2 6 5 6 6 8 3	Difference.
	8 5 4 6 7 3 5 2 0 4	Proof.

How much does 589607 exceed 256980?

What is the difference between 5080 and 20500?

How much is 27030 less than 1,000,000

MULTIPLICATION.

Teacheth how to increase the greater of two numbers given as often as there are Units in the less, and compendiously performs the office of many Additions.

To this Rule belong three principal Members, namely :

The Multiplicand, or number to be Multiplied ;

The Multiplier, or number by which you Multiply ;

The Product, or number produced by Multiplying.

Rule.—Place the Multiplier under the Multiplicand, then beginning with the Units figure of the Multiplier, Multiply each figure in the Multiplicand by it, carrying as in Addition, and placing the right hand figure of each particular product (if the Multiplier consists of more figures than one) directly under the figure you Multiply by ; then add the several products together, and their sum will be the total product.

Before proceeding to any operations in this Rule, the following Table of products should be learned very perfectly.

MULTIPLICATION TABLE.

Twice 2 are	..	4	3 times 2 are	..	6	4 times 2 are	..	8
3	..	6	3	..	9	3	..	12
4	..	8	4	..	12	4	..	16
5	..	10	5	..	15	5	..	20
6	..	12	6	..	18	6	..	24
7	..	14	7	..	21	7	..	28
8	..	16	8	..	24	8	..	32
9	..	18	9	..	27	9	..	36
10	..	20	10	..	30	10	..	40
11	..	22	11	..	33	11	..	44
12	..	24	12	..	36	12	..	48

5 times 2 are 10
3 .. 15
4 .. 20
5 .. 25
6 .. 30
7 .. 35
8 .. 40
9 .. 45
10 .. 50
11 .. 55
12 .. 60

6 times 2 are 12
3 .. 18
4 .. 24
5 .. 30
6 .. 36
7 .. 42
8 .. 48
9 .. 54
10 .. 60
11 .. 66
12 .. 72

7 times 2 are 14
3 .. 21
4 .. 28
5 .. 35
6 .. 42
7 .. 49
8 .. 56
9 .. 63
10 .. 70
11 .. 77
12 .. 84

8 times 2 are 16
3 .. 24
4 .. 32
5 .. 40
6 .. 48
7 .. 56
8 .. 64
9 .. 72
10 .. 80
11 .. 88
12 .. 96

9 times 2 are 18
3 .. 27
4 .. 36
5 .. 45
6 .. 54
7 .. 63
8 .. 72
9 .. 81
10 .. 90
11 .. 99
12 .. 108

10 times 2 are 20
3 .. 30
4 .. 40
5 .. 50
6 .. 60
7 .. 70
8 .. 80
9 .. 90
10 .. 100
11 .. 110
12 .. 120

11 times 2 .. 22
3 .. 33
4 .. 44
5 .. 55
6 .. 66
7 .. 77
8 .. 88
9 .. 99
10 .. 110
11 .. 121
12 .. 132

12 times 2 .. 24
3 .. 36
4 .. 48
5 .. 60
6 .. 72
7 .. 84
8 .. 96
9 .. 108
10 .. 120
11 .. 132
12 .. 144

When Ciphers are placed between the significant figures in the Multiplier, they may be omitted; but great care must be taken that the next figure be put one place more to the left hand, that is under the figure you multiply by.

When there are Ciphers at the end of the multiplicand or multiplier, they may be omitted, by only multiplying by the rest of the figures, and setting down on the right hand of the total product as many Ciphers as were omitted.

When the Multiplier is a composite number, that is, if any two or more figures being multiplied together, will make that number, then multiply by one of those figures; and that product by the others will give the answer.

Proof.—The most sure and unerring way is by Division, otherwise make the former multiplicand the multiplier, and the multiplier the multiplicand, and proceed as before, and the new product will be the same as the former when the work is right.

COMPOSITE NUMBERS.

Each number consisting of three Component parts, within the limits of the Multiplication Table.

No.	*Comp. Parts.*			*No.*	*Comp. Parts.*		
75	5	5	3	162	9	9	2
98	7	7	2	165	11	5	3
105	7	5	3	168	8	7	3
112	8	7	2	175	7	5	5
125	5	5	5	176	11	8	2
126	9	7	2	180	10	9	2
128	8	8	2	189	9	7	3
135	9	5	3	192	12	8	2
140	10	7	2	196	7	7	4
147	7	7	3	198	11	9	2
150	10	5	3	200	10	10	2
154	11	7	2	210	10	7	3
160	10	8	2	216	12	9	2

	Comp.	*Parts.*		*No.*	*Comp.*	*Parts.*	
0	11	10	2	432	12	9	4
4	8	7	4	440	11	10	4
5	9	5	5	441	9	7	7
1	11	7	3	448	8	8	7
0	12	10	2	450	10	9	5
2	11	11	2	462	11	7	6
3	9	9	3	480	12	10	4
5	7	7	5	484	11	11	4
0	10	5	5	486	9	9	6
2	12	7	3	490	10	7	7
6	8	8	4	495	11	9	5
4	11	6	4	500	10	10	5
0	10	9	3	504	9	8	7
5	11	5	5	512	8	8	8
0	10	7	4	528	12	11	4
8	12	12	2	539	11	7	7
7	14	9	3	540	10	9	6
0	10	10	3	550	11	10	5
8	11	7	4	560	10	8	7
5	9	7	5	567	9	9	7
0	10	8	4	576	12	12	4
4	9	9	4	594	11	9	6
0	11	10	3	600	12	10	5
6	12	7	4	605	11	11	5
3	7	7	7	616	11	8	7
0	10	7	5	630	10	9	7
2	11	8	4	640	10	8	8
0	12	10	3	648	9	9	8
3	11	11	3	660	11	10	6
8	9	7	6	672	12	8	7
4	8	8	6	693	11	9	7
5	11	7	5	700	10	10	7
2	8	7	7	720	12	10	6
6	11	9	4	726	11	11	6
0	10	10	4	729	9	9	9
5	9	9	5	756	12	9	7
0	10	7	6	768	12	8	8

No.	*Comp. Parts.*		
770	11	10	7
792	12	11	6
800	10	10	8
810	10	9	9
840	12	10	7
847	11	11	7
864	12	9	8
880	11	10	8
891	11	9	9
900	10	10	9
924	12	11	7
960	12	10	8
968	11	11	8
972	12	9	9
990	11	10	9
1000	10	10	10
1008	12	12	7
1056	12	11	8
1080	12	10	9
1089	11	11	9
1100	11	10	10
1152	12	12	8
1188	12	11	9
1200	12	10	10
1210	11	11	10
1296	12	12	9
1320	12	11	10
1331	11	11	11
1440	12	12	10
1452	12	11	11
1584	12	12	11
1728	12	12	12

EXAMPLES.

Multiply 765430298 by 2 to 12.

Required the product of 273580 and 23.

What is the product of 751987 and 58?

What is the product of 987654 and 765?

What is the product of 1678954 and 306504?

Multiply 718603400 by 57.

Multiply 8760349 by 81.

Multiply 7639876 by 45.

DIVISION.

Division is the finding how often one number is contained in another; or the dividing any given number, into any proposed number of equal parts.

The number to be divided is called the Dividend.

The number by which you divide, the Divisor.

The number which shews how often the Divisor is contained in the Dividend, is named the Quotient; and when there is any number over at last, it is called the remainder.

CASE I, OR SHORT DIVISION.

Place the Divisor on the left hand of the Dividend, and draw a curved line between them; consider how many times the Divisor is contained in the left hand figure (or if not contained in one figure, in the first two) set the number of times under the right hand figure of the Dividend used; and add the remainder, if and, as so many tens to the next figure of the Dividend. Find how many times the Divisor is contained in that number; if contained therein, place the number of times in the quotient as before; if not, place a Cipher, and again add the numbers as tens, to the next figure in the Dividend, and then try how many times the Divisor is contained in that number; proceed in this manner to the last figure of the Dividend. When there is a remainder, it may be set on the right hand of the quotient with the divisor beneath it like a fraction, thus, $\frac{5}{8}$, $\frac{6}{9}$, $\frac{3}{12}$,

CASE 2, OR LONG DIVISION.

Set the Divisor and Dividend as directed in Case 1, add a curved line also to the right of the Dividend for the reception of the Quotient; find how many times the Divisor is contained in the first equal, or greater number of figures on the left of the Dividend; set the number of times in the Quotient on the right hand of the Dividend, and multiply the Divisor by it; Subtract the product from the same Dividend figures, if the work is right the remainder will be less than the Divisor.

Place a dot under the next figure of the Dividend, and bring it down to the right of the remainder; consider how many times the Divisor is contained in this unmber, if contained therein proceed as before; if not, place a Cipher in the Quotient, and bring down the next figure, always placing a Cipher in the Quotient for each figure brought down, when the Divisor is not contained in the number; proceed in this manner till every Dividend figure is used, and the remainder at last must be placed as in Case 1.

When there are Ciphers at the end of the Divisor they may be cut off, and as many places from off the right hand of the Dividend; but care must be taken to place the Dividend figures, so cut off, on the right hand of the remainder at last, and the Divisor, including the Ciphers, underneath as before.

Proof.—Multiply the Divisor and Quotient together, adding in the remainder (if any) and the Product will be the same as the Dividend.

EXAMPLES.

Dividend.
Divisor 6) 3 2 7 8 9 5 4

Quotient 5 4 6 4 9 2 $\frac{2}{6}$ remainder.

Divide 87695432 by 2 to 12.

Dividend. Quotient.
Divisor 36)478976(13304 $\frac{32}{36}$
36····
118
108
109
108
176
144
32 remainder.

Divide 7643210 by 27. Answer 283081 $\frac{23}{27}$

Divide 987642 by 108. Answer 9144 $\frac{90}{108}$

MONEY TABLES, &c.

Accounts are kept in Pounds, Shillings, Pence, and Farthings.

4 Farthings ...... make 1 Penny.
12 Pence .... 1 Shilling.
20 Shillings .... 1 Pound.

£ The initial of the Latin word Librae, Pounds.
S. The initial of Solidi, Shillings.
D. The initial of Denarii, Pence.

FARTHING TABLE.

f.		*d.*	*f.*		*d.*
4	make	1	15	make	3¾
5	..	1¼	16	..	4
6	..	1½	17	..	4¼
7	..	1¾	18	..	4½
8	..	2	19	..	4¾
9	..	2¼	20	..	5
10	..	2½	21	..	5¼
11	..	2¾	22	..	5½
12	..	3	23	..	5¾
13	..	3¼	24	..	6
14	..	3½			

PENCE TABLE.

d.	make	*s.*	*d.*	*d.*	make	*s.*	*d.*
12	..	1	0	40	..	3	4
15	..	1	3	42	..	3	6
18	..	1	6	48	..	4	0
20	..	1	8	50	..	4	2
24	..	2	0	54	..	4	6
30	..	2	6	60	..	5	0
36	..	3	0	66	..	5	6

d.		s.	d.	d.		s.	a.
70	make	5	10	108	make	9	0
72	..	6	0	110	..	9	2
80	..	6	8	120	..	10	0
84	..	7	0	130	..	10	10
90	..	7	6	140	..	11	8
100	..	8	4	144	..	12	0

SHILLINGS TABLE.

s.		£	s.	s.		£	s.
20	make	1	0	120	make	6	0
30	..	1	10	130	..	6	10
40	..	2	0	140	..	7	0
50	..	2	10	150	..	7	10
60	..	3	0	160	..	8	0
70	..	3	10	170	..	8	10
80	..	4	0	180	..	9	0
90	..	4	10	190	..	9	10
100	..	5	0	200	..	10	0
110	..	5	10				

TABLES OF WEIGHTS AND MEASURES.

TROY WEIGHT.

			Mark.
24 Grains *(gr.)*	make	1 Pennyweight	*dwt.*
20 Pennyweights	..	1 Ounce......	*oz.*
12 Ounces		1 Pound......	*lb.*

By this are Weighed Gold, Silver, Jewels, and Liquids.

AVOIRDUPOIS WEIGHT..

16 Drams (*dr.*)	make	1 Ounce.......	*oz.*
16 Ounces		1 Pound.......	*lb.*
28 Pounds		1 Quarter	*qr.*
4 Quarters, or 112lb.		1 Hundred Wt.	*cwt.*
20 Hundred		1 Ton	*Ton.*

By this are Weighed all Goods of a coarse or drossy nature, as Meat, Grocery Wares, Pitch, &c. and all Metals, except Gold and Silver.

APOTHECARIES WEIGHT.

20 Grains (*gr*) make	1	Scruple	℈
3 Scruples	1	Dram	ʒ
8 Drams	1	Ounce	℥
12 Ounces	1	Pound	℔

Apothecaries mix their Medicine by this Weight; but uy and sell by the Avoirdupois.

CLOTH MEASURE.

2¼ Inches make	1	Nail	*n.*
4 Nails	1	Quarter	*qr.*
4 Quarters	1	Yard	*yd.*
5 Quarters	1	English Ell	*En. e.*
3 Quarters	1	Flemish Ell	*F. e.*
6 Quarters	1	French Ell	*Fr. e.*

LONG MEASURE.

3 Barleycorns make	1	Inch	*in.*
12 Inches	1	Foot	*ft.*
3 Feet	1	Yard	*yd.*
6 Feet	1	Fathom	*fa*^{m}.
5½ Yards	1	Pole or Rod	*p.*
40 Poles	1	Furlong	*fur.*
8 Furlongs	1	Mile	*m.*
3 Miles	1	League	*lea.*
60 Geographical, or 69½ British Miles	1	Degree	*deg.*

By this is measured the distance of Places, or any thing else where length only is considered.

ALE AND BEER MEASURE.

2	Pints	make	1	Quart	*Q.*
4	Quarts		1	Gallon	*Gal.*
9	Gallons		1	Firkin	*Fir.*
2	Firkins		1	Kilderkin	*Kil.*
2 36	Kilderkins, or Gallons		1	Barrel	*Bar.*
54	Gallons		1	Hogshead	*Hhd.*
108	Gallons		1	Butt	

WINE MEASURE.

4	Gills	make	1	Pint	*P.*
2	Pints		1	Quart	*Qt.*
4	Quarts		1	Gallon	*Gall.*
10	Gallons		1	Anker of Brandy	*An.*
18	Gallons		1	Runlet	*Run.*
31½	Gallons		1	Barrel, or ½ Hogshead.	
63	Gallons		1	Hogshead	*Hhd.*
42	Gallons		1	Tierce	*T.*
84	Gallons		1	Puncheon	*Pun.*
126	Gallons		1	Pipe	*Pipe.*
252	Gallons		1	Tun	*Tun.*

Note.—The Imperial Gallon contains 277 Cubical Inches.

DRY MEASURE.

2	Pints	make	1	Quart	
4	Quarts		1	Gallon	
2	Gallons		1	Peck	*P.*
4	Pecks		1	Bushel	*Bu.*
8	Bushels		1	Quarter	*Qu.*
5	Quarters		1	Wey	*Wey.*
2	Weys		1	Last	*Last.*

By this Measure Corn, Seed, Roots, &c. and other di Goods are measured.

COALS.

4	Pecks	make	1 Bushel	*Bu.*
3	Bushels		1 Sack	*S.*
12	Sacks		1 Chaldron	*Cha.*
21	Chaldron		1 Score	*Sc.*

TIME.

60	Seconds	make	1 Minute	*M.*
60	Minutes		1 Hour	*H.*
24	Hours		1 Day	*D.*
7	Days		1 Week	*Wk.*
4	Weeks		1 Month	*Mth.*
12	Calendar Month, or 52 Weeks 1 day, or 365 Days		1 Year.	

Leap Year may be found by dividing the Year by 4; if there be no remainder it is Leap Year.

It has been determined by Astronomical Observations, that the Solar Year is 365 *d.* 5 *h.* 48 *m.* 48 *s.*

To know the number of Days in each Month, observe,

Thirty Days hath September,
April, June, and November;
February, hath Twenty-eight alone;
And all the rest have thirty-one,
Except in Leap Year, then's the time,
February's Days are Twenty-nine.

SQUARE MEASURE.

144	Inches	make	1 Square Foot	*ft.*
9	Square Feet		1 Square Yard	*y.*
100	Square Feet		1 Square of Flooring	
30¼	Square Yards		1 Pole	*p.*
40	Poles		1 Rood	*rd.*
4	Roods		1 Acre	*a.*
640	Acres		1 Square Mile.	

By this Measure all kinds of Artificers work are measured, and all dimensions of length and breadth only.

CUBIC OR SOLID MEASURE.

1728	Cubic Inches	make	1 Cubic Foot.
27	Cubic Feet		1 Cubic Yard.
48	Feet of rough, or 50 Feet of hewn Timber		1 Ton or Load.
42	Cubic Feet		1 Ton of Shipping.

By this Measure Stone, Timber, and all works that have length, breadth, and thickness, are measured.

MISCELLANEOUS.

A Peck of Salt is	14*lb.*
A Stone of Meat	8*lb.*
A Firkin of Butter	56*lb.*
A Fother of Lead	19½ *cwt.*

56*lbs.* of Old, and 60*lbs.* of New Hay, 1 Truss.
36 Trusses 1 Load.

COMPOUND ADDITION.

Compound Addition is the finding the sum or total of several Compound numbers.

Rule.—Arrange the numbers so that those of the same denomination may stand directly under each other, and draw a line under them.

Add the numbers in the lowest denomination together, and find how many Units of the next higher denomination are contained in their sum. Write down the remainder and carry the Units to the next higher denomination, and proceed thus to the end.

Proof, as in Simple Addition.

Note.—In adding the column of Shillings, the scholar may proceed as in simple Addition, setting down the right hand figure of the sum of the Units in its proper place, and carrying the left hand figure to the Tens, the sum of which being divided by 2, the remainder, if any, is set down in the place of Tens, and the quotient carried to the Pounds. In like manner in Land Measure, in carrying at 40, divide by 4; and so in every case of an even number of Tens.

EXAMPLES.

1. Suppose that A. is indebted to B. 34*l.* 13*s.* 7*d.* and to C. 1730*l*, to D. 9*l.* 19*s.* 2*d.*, to E. 134*l.* 0*s.* 7*d.* to F. 17*s.* 2*d.*, and to G. 9*d.* What is A's whole debt? *Answ.* 1909*l.* 11*s.* 3*d.*

2. A Gentleman bought of a Silversmith, Dishes to the weight of 23*lbs.* 6*oz.* 5*dwt.*; Plates 41*lbs.* 7*oz.* 17*dwt.*; Spoons 12*lbs.* 15*dwt.*; Salts 2*lbs.* 7*oz.*; Waiters 13*lbs*; and Tankards 7*lbs.* 17*dwt.* What weight of plate did he buy in all? *Answ.* 99*lbs.* 10*oz.* 14*dwt.*

3. There are five pieces of Ground, the first of which measures 13*ac.* 3*r.* 14*p.*; the second 27*ac.* 29*p*; the third 19*ac.* 1*r.*; the fourth 3*r.* 34*p.*; and the fifth 45*ac.* 2*r.* 11*p.* What is the sum of the Measures? *Answ.* 106*ac.* 3*r.* 8*p.*

4. A Gentleman bought of a Wine Merchant, of Port Wine 1*tun.* 3*hhds.*; of Claret 3*hhds.* 47*gals.*; of Mountain 1*hhd.* 5*gals.*; and of Lisbon 2*hhds.* 23*gals.* What quantity did he buy in all? *Answ.* 3 *Tuns.* 2 *hhds.* 12 *gals.*

5. A Carrier removes for a Shopkeeper 8 bags, weighing 45*cwt.* 2*qrs.* 8*lbs*; Cheeses weighing 8*cwt.* 3*qrs.* 26*lbs.*; Butter weighing 12*cwt.* 2*qrs.* 19*lbs*; Tea 2*cwt.* 3*qrs.*; and Salt 1*cwt.* 0*qrs.* 6*lbs.* How much weight will the carrier have to charge? *Answ.* 71*cwt.* 0*qrs* 3*lbs.*

6. What is the sum of the following Debts £30 6*s.* 6*d.* £24 19*s.* 11¾*d.*, £1 1*s.* 2*d.*, £1 11*s.* 6*d.*, £1 10*s.* 11¾*d.*, and 37*s.* *Answ.* £61 7*s.* 1½*d.*

COMPOUND SUBTRACTION.

Compound Subtraction is the finding the difference between two numbers, of which one, or both, are Compound.

Rule.—Arrange the numbers as in Addition (observing to place the less number below the greater,) then beginning at the lowest denomination, proceed as in Simple Subtraction; only when the upper number is the less, borrow as many as are equal to one of the next denomination; that is, in farthings borrow four, in pence twelve, in shillings twenty, and in like manner in any other denomination. proceeding in that case as the tables direct.

Proof.—The same as in Simple Subtraction.

7. Borrowed 67*l.* 8*s.* 9¼*d.* Paid 19*l.* 18*s.* 11½*d.* What remains to pay? *Answ.* 47*l.* 9*s.* 9¾*d.*

8. The great Bell at Oxford, weighs 7*tons.* 11*cwt.* 3*qrs.* 4*lbs.*, and the great Tom of Lincoln, weighs 4*tons.* 16*cwt.* 3*qrs.* 16*lbs.* What is the difference in their weight? *Answ.* 2*ton.* 14*cwt.* 3*qrs.* 16*lbs.*

9. Jacob's contract was to serve Laban 14 years for his two Daughters; when he had accomplished 11 *years,* 11 *months,* 11 *weeks,* 11 *days,* and 11 *hours.* How long had he to serve? *Answ.* 1 *Y.* 9 *M.* 3 *W.* 2 *D.* 13 *H.*

10. A Corn Merchant sends over the sea, Wheat 29 *lasts.* 3 *qrs.*, by an accident, 3 *lasts.* 3 *qrs.* 2 *bush.* and 1 *peck,* was damaged. How much still remained of the good Wheat? *Answ.* 25 *L.* 9 *qrs.* 5 *bu.* 3 *peck.*

11. A Wine Merchant who had 6 Tuns of Wine in his Cellar, sells 3*hhds.* 15*gals.* 3*qts.* What had he then left? *Answ.* 5 *Tun.* 47*gals.* 1*qt.*

12. A Freeholder possessed of 600 Acres, gave his eldest Son 100*ac.* 2*rds.* and 8 *ft.* What quantity of Land after this did he possess? *Answ.* 499*ac.* 1*rd,* 39*p.* 29¼*yds.* 1*ft.*

13. A Draper's stock is 856 Yards, he sells 225 *yards.* *2qrs.* 1 *n.* and 1*in.* What is his remaining stock?
Answ. 630 *yards.* 1*qr.* 2*n.* 1¼*in.*

COMPOUND MULTIPLICATION.

Compound Multiplication is the method of finding what any given number, of different denominations, will amount to, when repeated a certain proposed number of times. When the given multiplier does not exceed 12.

Rule.—Write the multiplier under the lowest denomination of the multiplicand, multiply every number of the multiplicand by the multiplier, and bring the several products, as they occur, to the next higher denomination; write down the remainders, and carry the integers to the next product.

Multiply 3987*l.* 4*s.* 6½*d.* by 2 to 12 respectively.

14. 5lbs. of Sugar, at 1*s.* 3*d.* *per lb.* *Answ.* 6*s.* 3*d.*

15. 9 Cwts. of Cheese, at 4*l.* 11*s.* 5*d.* *per cwt.*
Answ. 41*l.* 2*s.* 9*d.*

16. 12 Gallons of Rum, at 19*s.* 6*d.* *per gal.*
Answ. 11*l.* 14*s.*

When the multiplier is a composite number, or the product of two or more numbers in the table, multiply successively by each of its parts, instead of the whole number at once, and the last product will be the answer.

17. 28 Yards of Cloth, at 19*s.* 4*d.* *per yard.*
Answ. 27*l.* 1*s.* 4*d.*

18. 35 Firkins of Butter, at 2*l.* 15*s.* 3½*d.* *per Firkin.*
Answ. 96*l.* 15*s.* 2½*d.*

19. 64 Gallons of Rum, at 18*s.* 6*d.* *per gal.*
Answ. 59*l.* 4*s.*

20. 132 Yards of Irish, at 2*s.* 4*d. per yard.*
Answ. 15*l.* 8*s.*

21. 144 Reams of Paper, at 1*l.* 6*s.* 4*d. per ream.*
Answ. 189*l.* 12*s.*

When the multiplier is not a composite number, take that which is nearest to it, and multiply by its component parts, as before; then add or subtract as many times the first line, as the number so taken is greater or less than the given multiplier.

Note.—To multiply by ½ you must divide the value of 1 by 2, to multiply by ¼ you must divide by 4, and to multiply by all other fractions, you must first multiply the value of 1 by the numerator or top figure, and divide that product by the denominator or lower figure, which quotient will be the value of the fractional part.

22. 23 Ells of Dowlas, at 1*s*, 6½*d. per ell.*
Answ. 1*l.* 15*s.* 5½*d.*

23. 117¼ Cwts. of Raisins, at 4*l.* 2*s.* 3*d. per cwt.*
Answ. 482*l.* 3*s.* 9¾*d.*

24. 75⅜ Loads of Hay, at 3*l.* 19*s.* 9*d. per load.*
Answ. 300*l.* 11*s.* 1¾*d.*

25. 59 Chaldrons of Coals, at 58*s.* 6*d. per chaldron.*
Answ. 172*l.* 11*s.* 6*d.*

26. 125½lbs. of Coffee, at 4*s.* 3*d. per lb.*
Answ. 26*l.* 13*s.* 4½*d.*

27. 85¾ Tons of Iron, at 8*l.* 17*s.* 9½*d. per ton.*
Answ. 762*l.* 5*s.* 7½*d.*

28. Multiply 12*ton.* 8*cwt.* 3*qrs.* 16*lbs.* by 65.
Answ. 808*ton.* 18*cwt.* 0*qrs.* 4*lbs.*

29. Multiply 210 *yards.* 3 *qrs.* 3 *n.* by 12.
Answ. 2531 *yards.* 1 *qr.*

30. Multiply 6*tun.* 3*hhds.* 28*gals.* by 16.
Answ. 109*tun.* 3*hhds.* 7*gals.*

31. Multiply 73 *Wks.* 5*D.* 6*H.* 15*M.* by 24.
Answ. 1770 *Wks.* 0*D.* 6*H.*

32. Multiply 6*lea.* 2*m.* 7*fur.* 20*p.* by 19.
Answ. 132*lea.* 1*m.* 6*fur.* 20*p.*

BILLS.

33. *A Carpenter's Bill.*

			s.	*d.*	
65	Cubic feet of Oak ..	at	4	3	per foot.
125	Do. wrought and framed	at	5	8	..
15½	Square shed roofing ..	at	5	6	per squ.
8¾	Do. hip and valley roofing	at	8	2	..
10	Men's labour, for 5 days ea.	at	4	8	per day.
					£68 14 7½

34. *A Bricklayer's Bill.*

			£	*s.*	*d.*	
3¾	Rod of Grey Stock Brickwork, ...	at	13	13	0	per rod
50	Feet of pointing old work	at	0	0	5½	per ft.
45	Hods of Mortar ..	at	0	0	7	each.
2	Bricklayers 6¾ days ea	at	0	4	6	per day.
2	Labourers do. ..	at	0	2	4	..
						£58 5 2

35. *A Painter and Glazier's Bill.*

			s.	*d.*	
135	Yards of painting 3 times in oil	at	0	7½	per yd.
36	Sash Frames, ...	at	0	11	each.
65	Feet of Newcastle Glass	at	1	7½	per ft.
22½	Do. large size	at	2	1	do.
					£13 9 10½

DOUDECIMALS,

OR

SQUARING DIMENSIONS.

Rule.—Under the multiplicand, write the corresponding denominations of the multiplier.

Multiply each term in the multiplicand (beginning at the lowest) by the feet in the multiplier, write each result under its respective term, observing to carry an unit for every 12, from each lower denomination to its next superior.

In the same manner multiply the multiplicand by the inches in the multiplier, and write the result of each, one place more to the right hand of the multiplicand.

Work in the same manner with the seconds in the multiplier, setting the result of each term two places to the right hand of those in the multiplicand, and so on for thirds, fourths, &c.

Add the several products together, and their sum will be the total product.

Feet multiplied by Feet, give Feet.
Feet multiplied by Inches, give Inches.
Feet multiplied by Seconds, give Seconds,
Inches multiplied by Inches, give Seconds.
Inches multiplied by Seconds, give Thirds.
Seconds multiplied by Seconds, give Fourths.

		ft.	*in.*	*s.*		*ft.*	*in.*	*s.*		*ft.*	*in.*	*s.*
36.	Multiply	8	5	0	by	4	7	0	*Answ.*	38	6	11
37.	......	9	8	0	..	7	6	0	....	72	6	0
38.	......	7	5	9	..	3	5	3	....	25	8	6
39.	......	10	4	5	..	7	8	6	....	79	11	0
40.	......	75	7	0	..	9	8	0	....	730	7	8
41.	......	97	8	0	..	8	9	0	....	854	7	0

COMPOUND DIVISION.

Compound division, is the dividing compound numbers into any proposed number of equal parts.

Rule.—Place the divisor and dividend, as in Simple Division.

Begin at the highest denomination of the dividend, which divide by the divisor, and write down the quotient.

Multiply the remainder of the highest denomination, if any, by as many of the less next denomination as are equal to one of the remainder, that is, if Pounds, by 20, if Shillings, by 12, &c. adding to each product the odd quantity in the dividend of the same sort as itself; divide the number so found by the divisor, as before, and write down its respective quotient.

Proceed in this manner to the lowest denomination, and the whole quotient thus found will be the answer.

Proof.—By Compound Multiplication.

42. Cheese at *3l.* 12*s.* 6*d.* *per cwt.* What is that *per lb.*? *Answ.* 7¾*d.* 8 rem.

43. What did I pay a piece for Sheep, having bought 75 for 135*l.*? *Answ.* 1*l.* 16*s.*

44. I bought 144 pair of Stockings for 27*l.* How much is that for 2 pair? *Answ.* 7*s.* 6*d.*

45. 12 Tea spoons weigh 9*oz.* 17*dwt.* 12*gr.* What is the weight of each Spoon? *Answ.* 16*dwt.* 11*gr.*

46. Divide 1061*cwt.* 2*qrs.* by 28.
Answ. 37*cwt.* 3 *qrs.* 18*lbs.*

47. Divide 375*mi.* 2*fur.* 7*p.* 2*yds.* 1*ft.* by 39.
Answ. 9*mi.* 4*fur.* 39*p.* 1*yd.*

48. Divide 120*la.* 1*qr.* 1*bu* 2*pks.* by 74.
Answ. 1*la.* 6*qrs.* 1*bu.* 3*pks.*

49. Divide 120*mo.* 2*wks.* 3*ds.* 5*hs.* 20*m.* by 111.
Answ, 1*mo.* 0*wks.* 2*ds.* 10*hs.* 12*m.*

50. Divide 10*tun.* 2*hhds.* 17*gals.* 2*qts.* by 67.
Answ. 39*gals.* 2*qts.*

REDUCTION.

Reduction is the bringing of numbers of one denomination into that of another, retaining the same value, and is sometimes distinguished into two parts, namely, Ascending and Descending.

Ascending is when small names are to be changed into greater, as Pence into Shillings, Shillings into Pounds, &c. and is performed by dividing by as many of the less, as as are equal to one of the greater.

Descending is when great names are to be brought into smaller, as Pounds into Shillings, Pence into Farthings, &c. and is performed by multiplying by as many of the less, as are equal to one of the greater.

51. Reduce 5520 Pence into Shillings and Pounds.
Answ. 460*s.* or 23*l.*

52. Reduce 351*l,* 13*s.* 0¾*d.* to Farthings.
Answ. 337587 *farthings.*

53, In a 50*l.* Note, how many Guineas?
Answ. 47*gui.* 13*s.*

54. How many Pence are there in 79*l.* 15*s.*?
Answ. 19140*d.*

55. In 14 Ingots of Silver, each 27*oz.* 5*dwts.* how many Grains? *Answ.* 183120*grs.*

56. In 3 doz. Table Spoons, each weighing 2*oz.* 9*dwts.* how many Pounds? *Answ.* 7*lbs.* 4*oz.* 4*dwt.*

57. In 78 Bags of Hops, each weighing 2*cwt.* 3*qrs.* 6*lbs.* how many Pounds? *Answ.* 24492*lbs.*

58. How many Cwts. in 16208 Ounces?
Answ. 9cwt. 5lbs.

59. How many Pounds in 4896 Scruples?
Answ. 17lbs.

60. In 98465 Inches of Cloth, how many Yards and Ells English? *Answ. 2735yds. 5in. 2188ells. 5in.*

61. How many Inches are there between London and Bristol, a distance of 120 Miles? *Answ. 7603200in.*

62. In 1399200 Feet, how many Furlongs, Miles, and Leagues? *Answ. 2120fur. 265mi. 88lea.*

63. In 34 Gallons, how many Quarts and Pints?
Answ. 136qts. 272pts.

64. In a Hogshead of Wine, how many dozen of Quarts? *Answ. 21doz.*

65. In 40 Quarters of Wheat, how many Pecks and Gallons? *Answ. 1280pks. 2560gals.*

66. In 15360 Quarts of Corn, how many Quarters?
Answ. 60qrs.

67. Reduce 31556928 Seconds, to Days, &c.
Answ. 365ds. 5hs. 48m. 48s.

68. In 2967400 square Inches, how many square Yards? *Answ. 2289yds. 5ft. 136in.*

69. How many Poles are there in 997*acs.* 2*r.* 10*p.*?
Answ. 159610p.

70. How many solid Inches are there in 2 Loads, 12 Feet of hewn Timber? *Answ. 193536in.*

71. In 1259712 solid Inches, how many Yards?
Answ. 27yds.

PROPORTION,

OR

THE RULE OF THREE.

The Rule of Three teaches from three numbers given, to find a fourth, which shall have the same proportion to the second, as the third has to the first; that is, if the first be greater than the third, the second will be greater than the fourth; and if the first be less than the third, the second will be less than the fourth.

Rule.—State the question, that is, place the numbers in such order, that the first and third may be of one kind, and the second the same as the number required.

Bring the first and third numbers into one denomination, and the second into the lowest term mentioned.

Multiply the second and third numbers together, and divide the product by the first, the quotient will be the answer to the question in the same denomination as you left the second number in.

If there happen to be a remainder after the Division, reduce it into its next lower denomination below the last quotient, and divide by the same divisor, the quotient will be so many of the said next name; proceed in this manner to the least name, and all the quotients together will be the answer.

72. Gave 7½*d.* for 1*oz.* of Coffee, what must I give for 1*cwt.* *Answ.* 56*l.*

73. A Grocer bought 4*hhds.* of Sugar, each 12*cwt.* 2*qrs.* 12*lbs* and paid at the rate of 6½*d.* *per lb.* I demand what the 4*hhds.* came to? *Answ.* 153*l.* 1*s.* 5*d.*

74. If 1¼ day's pay be 4*s.* 3*d.* what must I receive for 49½ days? *Answ.* 8*l.* 8*s.* 3½*d.*

75, What is the value of a Silver Tankard, weighing 1*lb*. 8*oz*. at 5*s*. 3*d*. *per oz*? *Answ*. 5*l*. 5*s*.

76. Bought 12 Pockets of Hops, each weighing 1*cwt*. 2*qrs*. 17*lbs*. What do they come to at 5*l*. 1*s*. 4*d*. *per cwt*.? *Answ*. 100*l*. 8*s*. 6¾*d*.

77. How much Hay can I purchase for 55 Guineas, at 3*l*. 10*s*. *per load*? *Answ*. 16 *loads* 35 *rem*.

78. Bought Soap at 4*l*. 6*s*. *per cwt*. for how much *per lb*. must I sell it, to allow a profit of 1*d*. on each *lb*.? *Answ*. 10*d*.

79. If I buy 6½ Yards of Irish Cloth for 1*l*. 3*s*. 10*d*. How much must I pay for 8 pieces, each containing 26 Yards? *Answ*. 38*l*. 2*s*. 8*d*.

80. Suppose a Person saves out of his Income 5*s*. 6*d*. per week. How long will he be saving 100*l*.? *Answ*. 6 *yea*. 51 *wks*. 7 *rem*.

81. How much must be paid for 544 Bushels of Wheat, at 4*l*. 8*s*. *per qur*? *Answ*. 268*l*. 8*s*.

82. Bought 1 Cwt of Soap for 4*l*. 4*s*., and sold it by the *lb*. at 8½*d*. What did I gain or lose thereby? *Answ*. 4*s*. 8*d*. *lost*.

PRACTICE.

Practice is a method of finding the value of any quantity of goods, from the price of an integer being given.

Aliquot parts of any number, or quantity, are such as will exactly divide it, without leaving a remainder; thus 7 and 4 are Aliquot parts of 28. 4*d*. is the Aliquot part of a Shilling, and 5*s*. is an Aliquot part of a Pound.

TABLES OF ALIQUOT PARTS.

Aliquot parts of a £

s.	d.		
10	0	is	$\frac{1}{2}$
6	8	..	$\frac{1}{3}$
5	0	..	$\frac{1}{4}$
4	0	..	$\frac{1}{5}$
3	4	..	$\frac{1}{6}$
2	6	..	$\frac{1}{8}$
2	0	..	$\frac{1}{10}$
1	8	..	$\frac{1}{12}$
1	3	..	$\frac{1}{16}$
1	0	..	$\frac{1}{20}$

Parts of a Shilling.

d.		
6	..	$\frac{1}{2}$
4	..	$\frac{1}{3}$
3	..	$\frac{1}{4}$
2	..	$\frac{1}{6}$
$1\frac{1}{2}$	..	$\frac{1}{8}$
1	..	$\frac{1}{12}$

Parts of a Penny.

$\frac{1}{2}$	is	$\frac{1}{2}$
$\frac{1}{4}$	..	$\frac{1}{4}$

Aliquot parts of a Ton.

cwts.	qrs.	lbs.		
10	0	0	is	$\frac{1}{2}$
5	0	0	..	$\frac{1}{4}$
4	0	0	..	$\frac{1}{5}$
2	3	12	..	$\frac{1}{7}$
2	2	0	..	$\frac{1}{8}$

Parts of a Cwt.

qr.		
2	is	$\frac{1}{2}$
1	..	$\frac{1}{4}$
16*lb.*	..	$\frac{1}{7}$
14	..	$\frac{1}{8}$

Parts of a Qr.

lbs.		
14	is	$\frac{1}{2}$
7	..	$\frac{1}{4}$
4	..	$\frac{1}{7}$
$3\frac{1}{2}$	..	$\frac{1}{8}$
2	..	$\frac{1}{14}$

Parts of a lb.

oz.		
8	is	$\frac{1}{2}$
4	..	$\frac{1}{4}$
2	..	$\frac{1}{8}$
1	..	$\frac{1}{16}$

CASE 1.

When the price is less than a Penny.

Rule.—Divide the quantity by the Aliquot parts of a Penny, and the quotient by 12 and 20.

		d.		£	s.	d.
83.	3456 at	¼	*Answ.*	3	12	0
84.	347 at	½	....	0	14	5½
85.	846 at	¾	....	2	12	10½
86.	2240 at	¾	....	7	0	0

CASE 2.

When the price is an Aliquot part of a Shilling.

Rule.—Divide the given number by the Aliquot part, and this quotient by 20, and the answer will be in Pounds.

		d.		£	s.	d.
87.	437 at	1	*Answ.*	1	16	5
88.	352 at	1½	....	2	4	0
89.	5275 at	2	....	43	19	2
90.	1776 at	3	....	22	4	0

CASE 3.

When the price is Pence and Farthings, and no Aliquot part of a Shilling.

Rule.—Find what Aliquot part is nearest to the given price, and divide the proposed number by it. Consider what part the remainder is of this Aliquot part of the given price, and divide the former quotient by it, &c. Add the several quotients together, and the answer will be in Shillings, which divide by 20, to bring it into Pounds.

		d.		£	s.	d.
91.	1444 at	7¾	*Answ.*	46	12	7
92,	3214 at	8¾	....	117	3	6½
93.	6430 at	11¼	....	301	8	1½
94.	500 at	11¾	....	24	9	7

CASE 4.

When the price is more than one Shilling, and less than two.

Rule.—Let the number stand for Shillings, and work for Pence and Farthings, by the last Rule.

			s.	d.		£	s.	d.
95.	1678	at	1	3¾	*Answ.*	110	2	4½
96.	1004	at	1	8¼	....	84	14	3
97.	7506	at	1	9¾	....	680	4	7½
98.	5000	at	1	11	....	479	3	4

CASE 5.

When the price is any number of Shillings under 20.

Rule.—If the price is an even number, multiply the given quantity by half of it, doubling the first number to the right hand, for Shillings; and the rest of the product will be Pounds. If the price is an odd number, find the greatest even number, as before, to which add the $\frac{1}{20}$th of the given number for the odd Shilling, and the sum will be the answer.

			s.		£	s.	d.
99.	2710	at	6	*Answ.*	813	0	0
100.	2715	at	7	....	950	5	0
101.	2150	at	15	....	1612	10	0
102.	1621	at	18	....	1458	18	0

CASE 6.

When the price is Shillings and Pence.

Rule.—If they are an Aliquot part of a Pound, divide the quantity by that part, and the quotient will be the answer at once. If they are not an Aliquot part, multiply by the Shillings, and take parts for the Pence.

			s.	d.		£	s.	d.
103.	3150	at	3	4	*Answ.*	525	0	0
104.	7514	at	4	7	....	1721	19	2
105.	2547	at	7	3½	....	928	11	10½
106.	2510	at	14	7¼	....	1832	16	5½

Case 7.

When the price is Pounds and Shillings, or Pounds, Shillings, Pence, and Farthings.

Rule.—Multiply the quantity by the Pounds, and work the rest by the foregoing Rules.

			£	s.	d.		£	s.	d.
107.	2107	at	2	8	0	*Answ.*	5056	16	0
108.	368	at	3	15	6	....	1389	4	0
109.	200	at	6	14	10½	....	1348	15	0
110.	740	at	2	16	4	....	2084	6	8

Case 8.

If there be a fraction in the given quantity.

Rule.—Work for the whole number according to the preceding Rules, to which add ¼, ½, ¾, ⅛, &c. of the price according to the nature of the question.

			£	s.	d.		£	s.	d.
111.	273½	at	0	2	6	*Answ.*	34	3	9
112.	139¾	at	1	19	4	....	274	16	10
113.	371¾	at	4	13	7	....	1739	9	7¾
114.	284½	at	2	10	6	....	718	7	3

Case 9.

When the given quantity is of several denominations.

Rule.—Multiply the given price by the highest denomination, as in Compound Multiplication, and take parts of the price for the lower denominations, as in the former Rules.

115. 37*cwt*. 2*qrs*. 14*lbs*. at 7*l*. 10*s*. 9*d*. *per cwt*.
Answ. 283*l*. 11*s*. 11½*d*.

116. 17*cwt*. 1*qr*. 12*lbs*. at 1*l*. 19*s*. 8*d*. *per cwt*.
Answ. 34*l*. 8*s*. 6*d*.

117. 23*cwt*. 3*qrs*. 8*lbs*. at 3*l*. 19*s*. 11*d*. *per cwt*.
Answ. 95*l*. 3*s*. 8½*d*.

118. 39*cwt*. 0*qrs*. 10*lbs*. at 1*l*. 17*s*. 10*d*. *per cwt*.
Answ. 73*l*. 18*s*. 10¼*d*.

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